

ECOSYSTEM STATUS INDICATORS

Herring

Prince William Sound Pacific herring

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The Alaska Department of Fish and Game (ADF&G) has completed Pacific herring stock assessments in Prince William Sound (PWS) since ~1973. Population trends were initially monitored with aerial surveys to estimate biomass and the linear extent of beach used for spawning (Brady 1987), and have continued almost without interruption. Age, sex, and size data have been collected from most fisheries and spawning aggregations since 1973 (e.g., Baker et al. 1991). Dive surveys to estimate spawning biomass began with feasibility studies in 1983 and 1984 and continued in 1988-1992 (Brown and Baker 1998) and 1994-1997 (Willette et al. 1999). In 1993, ADF&G in cooperation with the Prince William Sound Science Center began fall acoustics surveys (e.g., Thomas and Thorne 2003). Spring (March/April) acoustics surveys have been conducted during 1995-2005. Age structured models have been used since 1993 to estimate historical population parameters and project future biomass, recruitment, and abundance (Funk 1994).

In the 1980s a strong recruitment occurred approximately every four years (Figure 49). The recruitment as age-3 fish from the 1984 and 1988 year classes were particularly large (~ 1 billion fish from 1984). The prefishery run biomass estimate peaked in 1988 and 1989 at >100,000 metric tons (mt; Figure 50). The 1993 biomass projection was >100,000 mt; however, the 1993 observed biomass was < 30,000 mt (Marty et al. 2003). The stock collapsed and the biomass has remained (1993 – 2005) at levels less than half of the 1980-1992 average of 84,000 mt. The causes of the decline have been hypothesized to be related to effects of the 1989 *T/V Exxon Valdez* oil spill, commercial harvesting, or environmental effects (Carls et al. 2002, Pearson et al. 1999, Thomas and Thorne 2003).

The Prince William Sound Pacific herring fishery is managed to allow harvest of 0-20% of the biomass above a spawning biomass threshold of 22,000 tons (20,020 mt). Since the stock collapse in 1993, purse seine sac roe harvest has only occurred in 1997 and 1998 (2 of 13 years). The fishery is also closed for the fall 2005 and spring 2006 fisheries because the projected biomass is below the threshold spawning biomass.

The variability of recruitment in Prince William Sound herring is probably at least related to large-scale environmental factors (Williams and Quinn 2000), smaller-scale environmental factors (Norcross et al. 2001) and disease (Marty et al. 2003, 2004). Disease assessments (1993-2002) indicate viral hemorrhagic septicemia virus (VHSV) and associated ulcers were related to population declines in 1993/1994 and 1998; and *Ichthyophonus hoferi* was related to a population decline in 2001 (Marty et al. 2004). The prevalence of *I. hoferi* increased significantly between 2002 (14%) and 2005 (25%), and this may cause increased mortality in the older age classes. The age-structured assessment model currently used by ADF&G was selected among several models that include disease information (Marty et al. 2004).

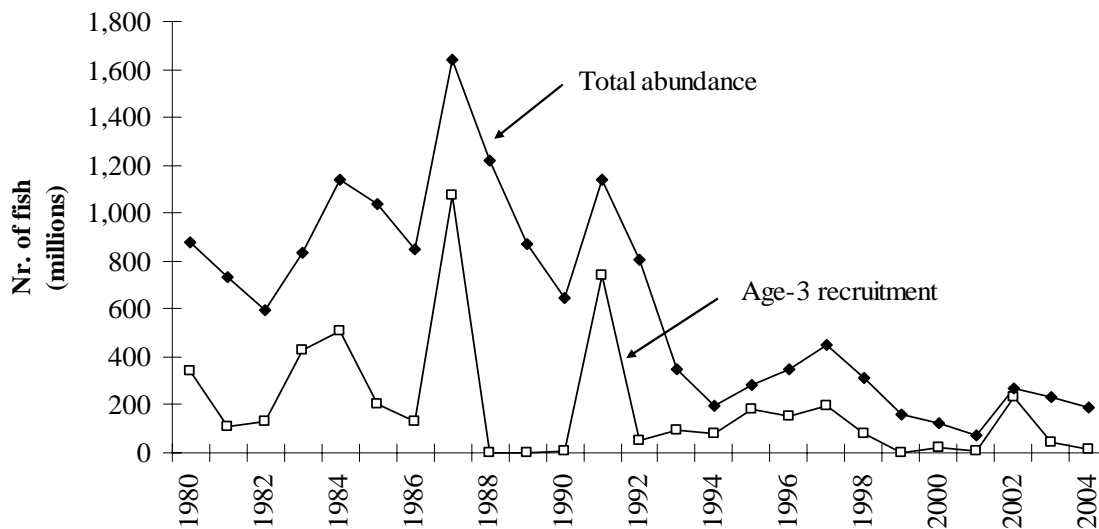


Figure 49. Age-3 recruitment and total prefishery abundance of Pacific herring in Prince William Sound, 1980-2004. The abundance values are outputs of the age-structured model used to produce the 2005 projections.

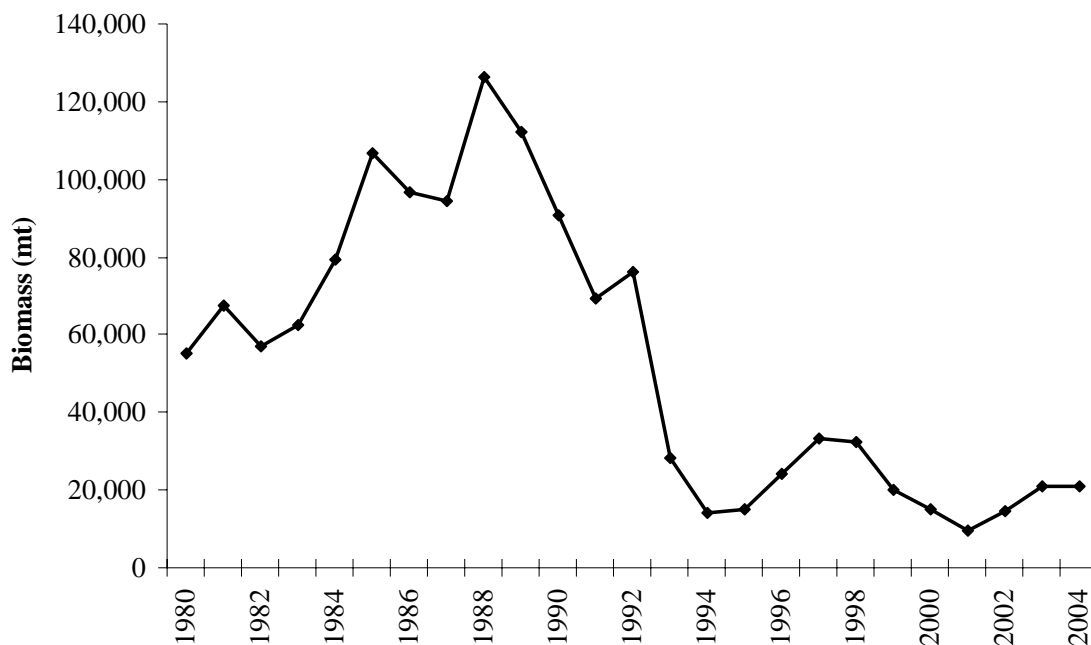


Figure 50. Prefishery run biomass (metric tons) of adult Pacific herring in Prince William Sound, 1980-2004. The biomass values are calculated from the age-structured model used to produce the 2005 projections.